CONNECTED 2007 INTERNATIONAL CONFERENCE ON DESIGN EDUCATION
9 – 12 JULY 2007, UNIVERSITY OF NEW SOUTH WALES, SYDNEY, AUSTRALIA

Elderly Drivers' Needs: Methodological Approach and its Application to the Educational Context

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ABSTRACT

The aim of this research is to explore the travel needs of Chinese older drivers in order to assist designers to better understand current and future users' needs. A methodological triangulation consisting of interviews, logbook and co-discovery is used to collect multiple forms of data and explore the research question.

The pilot study developed an initial concept model to identify older drivers' travel needs. Within this approach a vehicle is a "mediator" which gives a tangible expression about user's experiences. It is envisaged that the proposed model can play an important role in design education in order to help design students to better understand the relations between culture and design. The application of the model in an educational context will focus on vehicle design as a representative example.

INTRODUCTION

The aim of this research is to explore the travel needs of Chinese older drivers in order to assist design students to better understand current and future users' needs. Different researchers have recommended possible ways to improve safety with respect to older drivers in the Western countries. The available evidence showed that this research and their outcomes cannot significantly contribute in providing new knowledge for automotive designers to assist them to design a concept vehicle that would satisfy older drivers' needs within Chinese culture. Therefore, from a user-centre design perspective, the pilot study was conducted to research the future travel needs of the Chinese 'third age' population. The initial findings were reported which can help to validate research methods and guide the future research.

I. OLDER DRIVERS

Mobility is critical to the well being of older people. In order to maintain their quality of life, the aging population wish to do more everyday trips if it is practically feasible (Meyer 2004). According to the OECD (2001), different lifestyle groups are characterised by particular forms of mobility. It is important to note that automotive travel is a hard habit to break because of the psychological and symbolic rewards that have been associated with it (Burkhardt 2000). The future Chinese older generation who are used to travelling by driving in their middle-age also need the independence provided by a private car when they are retired.

A number of research projects have focused on the issues of the older driver population and travel pattern homogeneity (OECD 2001). More research is needed in terms of the relation between quality of life and mobility among older people in different cultures. Automobility highlights the multidimensionality of national identity formation (Edensor 2004). Therefore, product designers should realize the localization of product planning strategy in order to meet the local users' demands. However, the fact is that users living in Beijing use the same Volkswagen or BMW designed by multinational carmakers as those living in Brisbane due to the automobile industry's globalization process. Chinese designers are still given little opportunity to contribute to their designs.

II. HUMAN NEED AND PRODUCT MEANING

Few researchers have ever discussed the relationship between human needs, products and meanings. Recently, Maslow's hierarchy of basic human needs (Maslow 1987) was contested. Some researchers argue that the hierarchy of needs does not only move linearly in one direction from low levels to high levels (Rowan 1998). In addition, Patnaik and Becker's (1999) need-finding method indicates that discovering motivational needs is not only important for designers but the activity can be useful for the business, providing value beyond the development of a single product. Firstly, human need lasts longer than any specific solution. Secondly, needs are opportunities for design, not just guesses at the future. And thirdly, human needs provide a 'roadmap' for design (Patnaik and Becker 1999).

Meaning lies in the coming together of the self and artifacts in a particular cultural context (Krippendorff 2006). An empathic understanding of the existing meaningful relationships with products can be used for designing products to satisfy users' unmet needs. The literature demonstrates that there are many crossovers between human needs and products' meaning (Fig 1). Designers should adopt products' meaning as central to design in order to meet particular human needs.

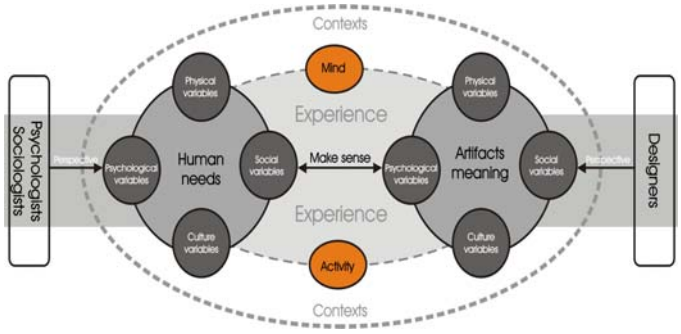

Fig. 1. Human needs and artifacts' meaning

III. Methodology

This study was designed to investigate the travel activities of current middle-aged and older drivers, and predict the older drivers' future travel needs from a vehicle design perspective. It envisages that the findings from this study might help to answer the research question:

How do the older generation's travel needs affect vehicle design in Chinese culture?

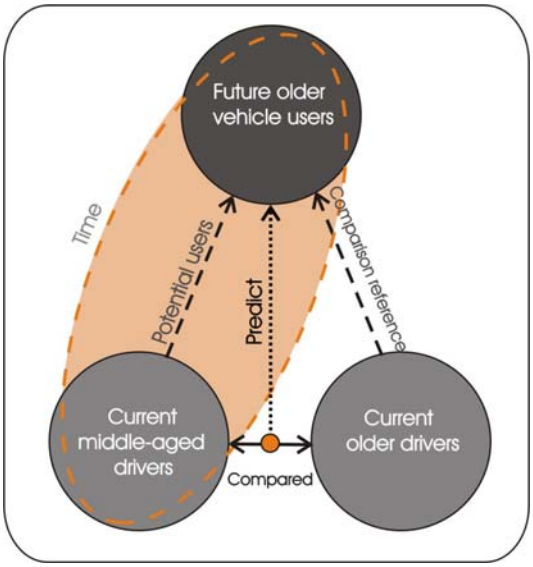

Fig. 2. Comparisons and prediction process

This study will gather two types of responses: twenty-six middle-aged drivers (45-59 years old) and ten older drivers (60 years old and above). The rationale about the number of middle-aged participants is based on the understanding that the target population of this study is middle-aged drivers who will potentially become older drivers in the next decade (Fig. 2). The pilot study conducted in Beijing was designed to involve six participants (one elderly and five middle-aged drivers). Such in-depth rich information from a small number of samples will be valuable to ensure validity of the qualitative research methods (Patton 2002). The pilot study was divided into two sections (Fig. 3). In Section A, the co-discovery method was employed to explore the older drivers' future activities related to use of vehicles. The participants were divided into three groups to discuss their future travel activities. Section B was designed to investigate older and middle-aged drivers' current travel needs. The interview and logbook methods were employed. This data triangulation approach seeks to develop an in-depth understanding of the research problem through collecting multiple forms of data (Fig. 3).

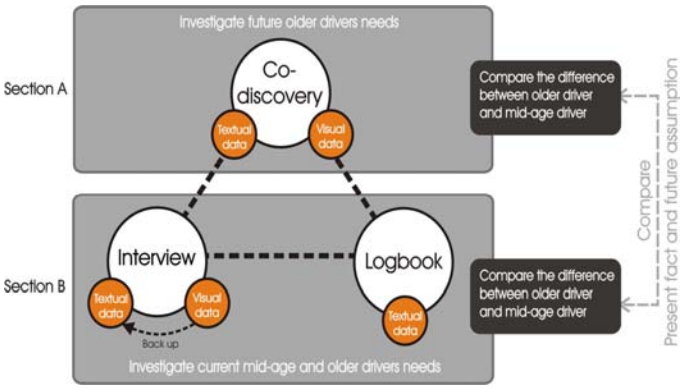

Fig. 3. Research methods

IV. Data Analysis

Grounded theory (Strauss and Corbin 1998) was employed to analyse the qualitative data. The analysis process is based on four steps for interpretation of outcomes. Firstly, this study focused on transcribing raw data, and identifying the categories and sub-categories. Secondly, themes and categories were related to their sub-categories to form more precise explanations about travel phenomenon. The third step started with rating the categories and sub-categories from the point of view frequency which can identify the significant themes and categories. Once the key factors emerged, they were entered into a conditional/consequential matrix (Fig. 4) to map out the connection among them during the forth step. Atlas.ti software was used in the coding and data analysis.

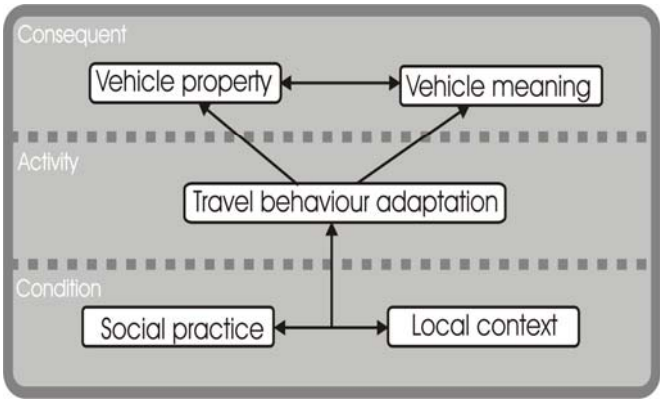

Fig. 4. Conditional/consequential matrix

The pilot study produced an ethnographic description of (i) social practice for maintaining quality of life, (ii) travel activity adaptation, (iii) local context, (iv) vehicle meaning for users and (v) vehicle property of user aspiration. From these five themes, 15 codes were generated (Table 1).

Table 1. Coding framework

Theme	Property	Code	Interpretation parameters	Example
Social practice for maintaining quality of life	Social activity for maintaining daily routine life	SAL	Regular patterns of activities that represent habitual behaviors and social affinities in daily life	'When I am retired, the family will be the centre for my life. Travel relates to go to hospital, shopping centre …'
	Social role adaptation	SRA	Social position and responsibility adjustment or change combining aging process	……
	Social acceptability	SAP	Identification of the social group membership	……
	Social accessibility	SAS	Aging related cognitive and physical capability	……
Travel activity adaptation	Travel modes	TMD	Older people's travel activities related to transport form selection	'…it is possible to take the subway, …'
	Travel patterns	TPT	Reliable samples of actions, tendencies, models or other observable characteristics of older people's travel activities	……
Local context	Socio-economic factors	SEF	Background and environment that related to local trade, industry, policy	……
	Local geography factors	LGF	Local nature features that affect the transportation conditions	'There are many problems i.e. traffic jams and no parking places in the city.'
Vehicle meaning for users	Social meaning	SMN	Psychosocial significances incorporating embodied user experience, identity building and social display when human interact with artifacts	'… older people don't care about status or class which can be seen by their car when they are retired.'
	Practical meaning	PMN	Functional and physical significances that relate to product benefits and values	……
	Cultural meaning	CMN	Sense coming together of the users and artifacts at the particular cultural context	……
Vehicle property of user aspiration	Economy	ECM	Vehicle properties that relate to cheap and efficient use or purchase	……
	Structure	STT	Physical vehicle properties with construction and configuration	……
	Function	FCT	Vehicle properties that enhance the physical action of users	'… it should have auto transmission; ….'
	Aesthetics	ATS	Emotional factors that induce appreciation of beauty with vehicle properties and driving interactions	……

V. Initial Findings

The data presented here were obtained from the pilot study analysis. Fig. 5 helps to identify significant themes through calculating the overall frequency counts of categories. Although the pilot study presents a similar frequency of themes between current and future travel needs, different patterns emerged between the two participant clusters when compared at the category level.

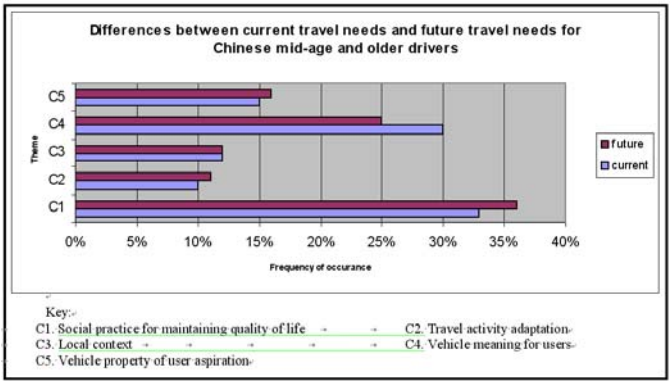

Fig. 5. Themes comparison

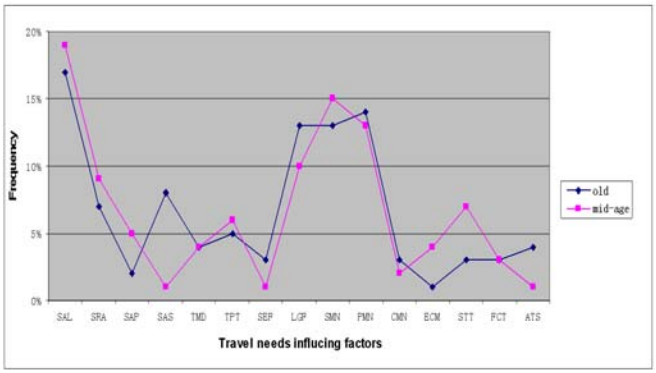

Fig. 6. Comparison of current travel needs

Fig. 6 shows the results of comparing current travel needs between middle-aged and old drivers at the category level. It is clear that older drivers are more concerned about social accessibility (SAS) and less about the social meaning of their vehicle (SMN) than middle-aged drivers. However, two curves show a similar tendency regarding travel needs.

Future travel needs are compared in Fig. 7. In their future life, middle-aged drivers are concerned more about social acceptability (SAP) and social meaning (SMN) than older drivers. Older drivers pay more attention to social accessibility (SAS) and practical meaning (PMN) than middle-aged drivers. Both groups highlight social activity and local geography categories. These findings show that social practice variables within the local context will determine the participants' macro-level needs. Middle-aged drivers need a vehicle to identify their social roles when they retire. Social meaning such as social role identity can be achieved by the use of appropriate shape and colour. Such symbol systems should come from local culture and could link with users' experience to construct the meaningful self-artefact interrelationship (Krippendorff 2006).

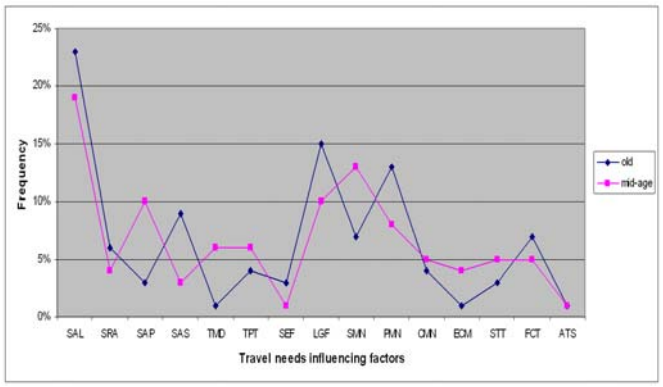

Fig. 7. Comparison of future travel needs

Fig. 8 illustrates that middle-aged drivers' current and future travel needs across at aesthetics (ATS). This suggests that users' current experience will influence their future attitude towards aesthetics. Current vehicle aesthetic elements such as form and colour would give design students valuable hints to predict users' future needs.

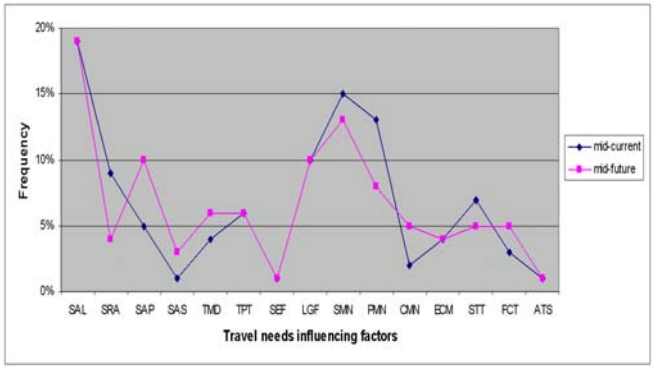

Fig. 8. Middle-aged drivers' present and future travel activities

Social practice for maintaining quality of life has been identified as the significant category (Fig. 5). Fig. 10 presents the classification of social practice which is constructed as a result of axial coding of the data and comparison across different age participants. The following analysis compares the middle-aged and older drivers travel needs at a sub-category level.

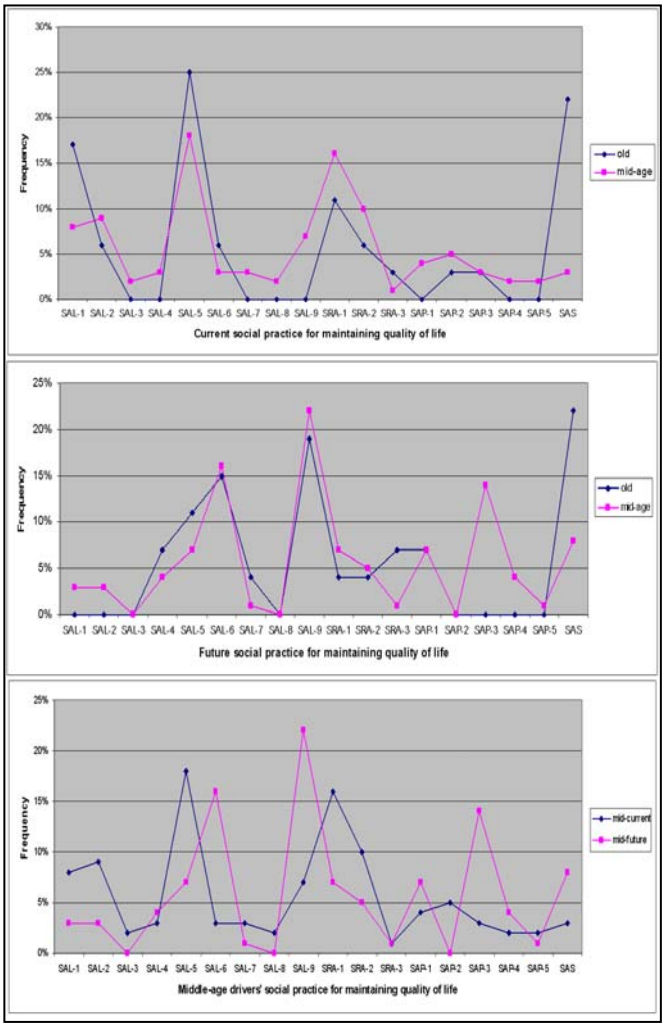

Fig. 9. Comparisons of social practice factors

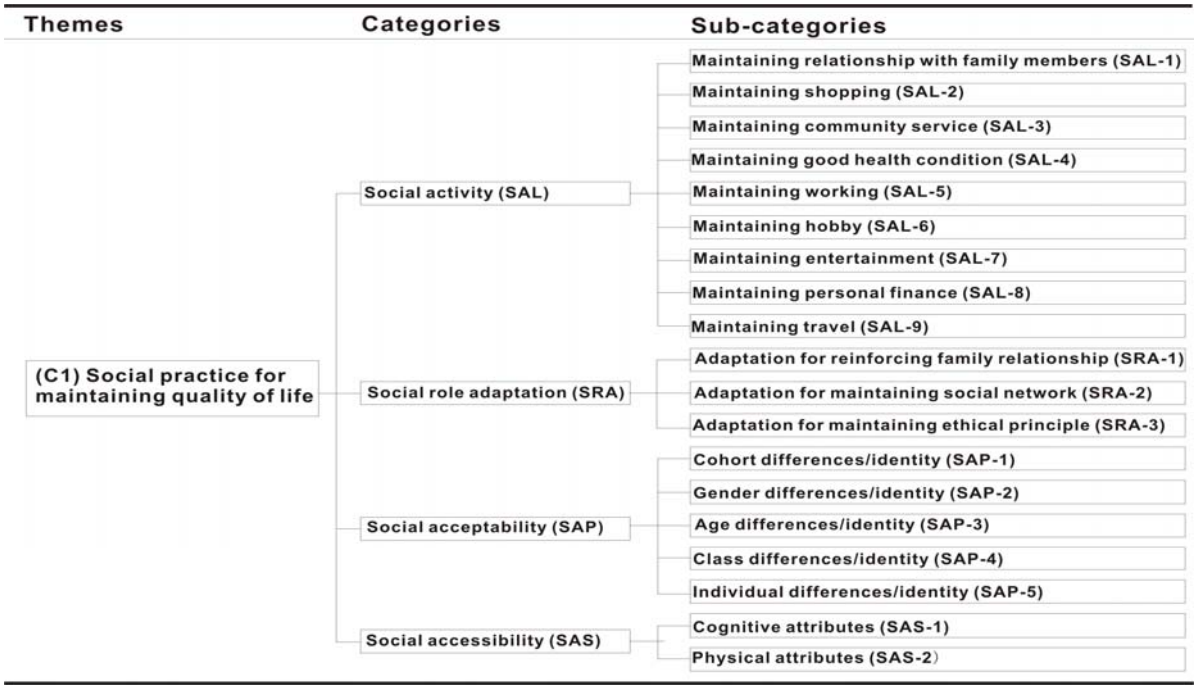

Fig. 10. Social practice categories

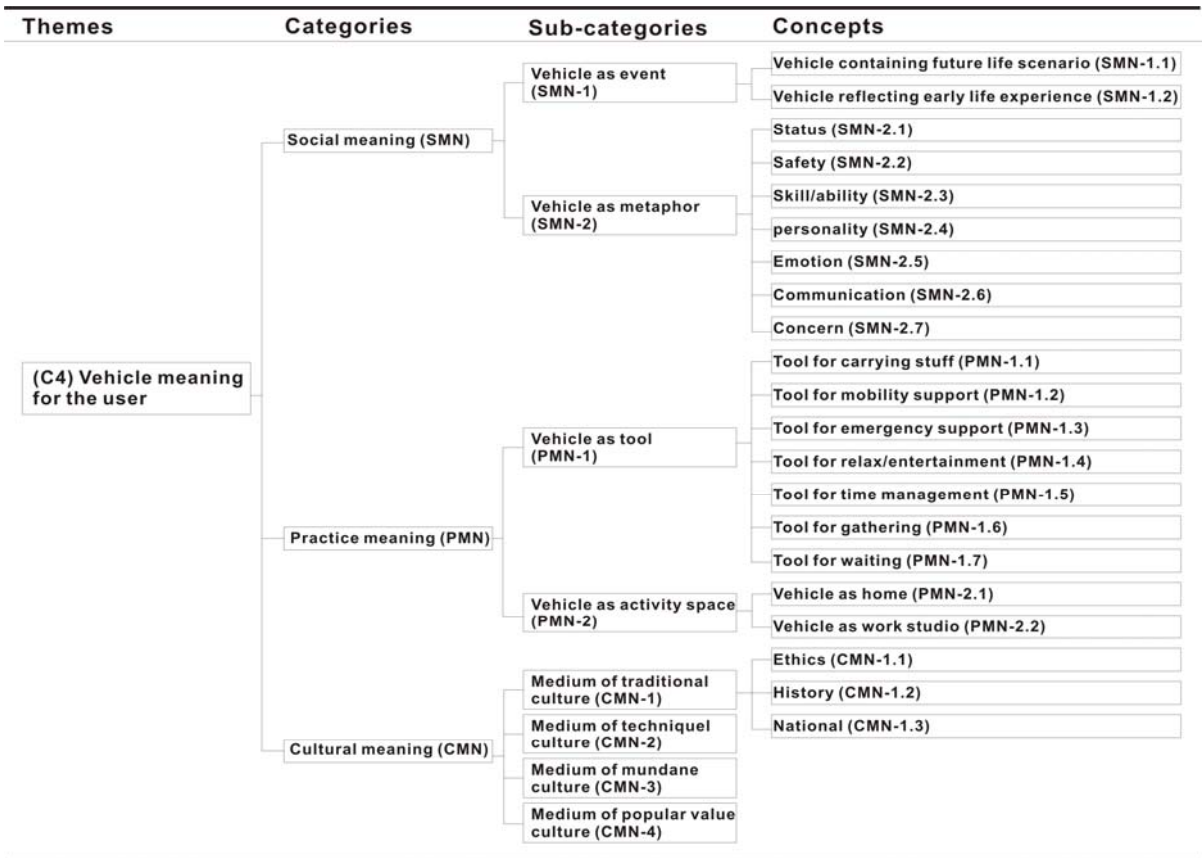

Fig. 11. Vehicle meaning categories

Table 2. Sample of protocol description

Example	Description
1	I would like to make artifacts and display them in the exhibition. I need a vehicle to carry these objects. So it needs to have a large space …’
2	The interior space is not designed for going to work or racing with young guys. Older people do not need fashionable models.
3	I might focus on cultural research because it is hard to keep up a good relationship with the company when I retire.

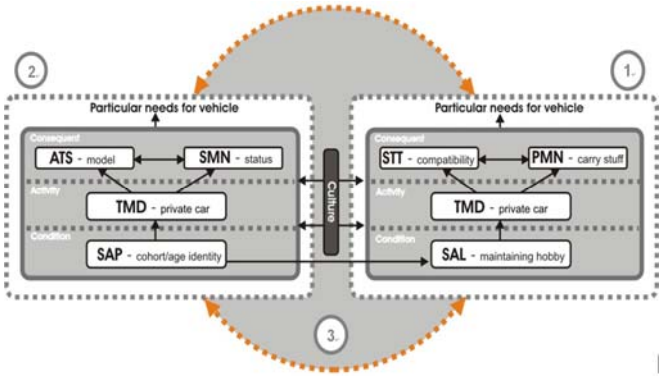

Fig. 12. Interactive circularity needs structure matrix

Fig. 9 illustrates the results of the integrated comparisons of social practice factors. It shows that middle-aged and older drivers have similar social activities both currently and in the future. For their current social activity, the need to maintain work is demonstrated prominently both for middle-aged and older drivers. The activities for maintaining hobby and travel are significant factors when both participant clusters imagine their future lifestyle. Therefore, vehicles should be designed to support their hobby activities. The need for cohort identity suggests that designs for older users' experience should be the main agenda in the vehicle design practice because cohort effect is related to each generation's experience. Future older generations are more concerned about age-related differences from social, economic and cultural perspectives rather than from a physical perspective.

Vehicle meaning (Fig. 11) is one of the most significant categories (Fig. 5). An artifacts' meaning is constructed by users' experiences and it reflects detail about user needs. This point suggests that designing for future older drivers should focus on researching their current lifestyle to give designers valuable information to guide design. Moreover, Chinese old drivers pay more attention to the traditional and mundane cultural meanings which can be observed by their activities such as gathering extended family members and celebrating traditional festivals. Compatible vehicle frameworks provide tangible property to support social practice and re-construct the vehicle's cultural meaning.

One of the future drivers' travel needs emerged when entering these categories into a conditional/consequential matrix (Fig.12). For example, age differences are related to hobby adaptation from a social network point of view. That is, social acceptability (SAP) such as age identity can affect the users' social activities (SAL) such as maintaining hobbies. Although each of them appeared in a different matrix which leads to a different consequence, it is easy to link them to each other due to this kind of interrelationship. Therefore, the initial needs' interrelationships show an interactive circularity structure rather than a linear hierarchy structure. In other words, we can develop matrix 1 based on data 1; develop matrix 2 based on data 2. Data 3 can link these two matrices through moving social acceptability to social activity (Table 2 & Fig. 12).

VI. Discussion

The pilot study has confirmed the validity of research methods as initial findings and the concept model have been relevant to the proposed research question. Firstly, the future older generations' travel needs are shaped by the interrelationships among five themes within the Chinese cultural framework. Social practice and vehicle meaning variables might be the foci of the vehicle design research.

Secondly, the meaning of a vehicle reflects human needs, focuses more sharply on specific needs and their direct implications for design. Future older drivers' needs should include inferences on latent variables such as vehicle meanings.

Thirdly, middle-aged and older vehicle users have similar current travel needs among most of the categories. This demonstrates that the local cultural context is a significant factor to shape current middle-aged and older drivers' travel needs because both groups use certain things within the same cultural context.

Fourthly, there are significant social and cultural needs for travel activity relating to leisure lifestyle, social role adaptation and social acceptability for the future older generations. Future older drivers will pay more attention to their self-identity through using a vehicle.

Based on the above findings, this study developed an initial concept framework (Fig. 13) to help identify the future Chinese older vehicle users' potential travel needs. An interactive network emerged between all factors that influence travel needs. Because the interrelationship among the five themes is a dynamic one; that is, not a basic or linear correspondence exists among them, this study adopted an interactive circularity model to identify the future Chinese older generations' travel needs. Older vehicle users' social practice within a particular local context generates human macro-needs which focus on maintaining quality of life. Within these macro-needs, mobility is critical to the well-being of older vehicle users. A vehicle serves to give a tangible expression through signs to users' relationships, experience and activity of interactions. Travel needs might emerge from the travel activity adaptation, vehicle property and vehicle meaning interactions. Chinese culture acts a dynamic role to link these factors and shape older vehicle users' travel needs. This model can be used to identify needs related to vehicle usage. During vehicle design practice, it could suggest an approach for the collection and structure of user research information. Design students will easily be able to relate these data to vehicle property as defined by users themselves.

VII. Conclusion

This study argues that vehicle innovation for local elderly drivers cannot be based only on the designer's intuitions but must be grounded in users' actual needs and activities. Vehicle designers need to understand what the vehicle means to the new aging population in particular cultural contexts.

Future works will focus on clarifying the initial concept model by analyzing the major experiment data. It is envisaged that the proposed model can play an important

role in design education in order to help design students better understand the relationship between culture and design. The application of the model in an educational context will focus on vehicle design as a representative example.

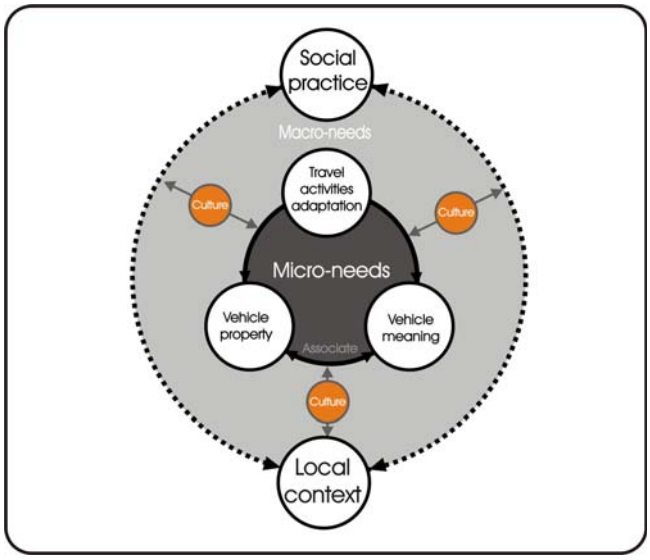

Fig. 13. Initial concept model

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